Morphology and wetting properties of Al-Fe alloy films obtained under conditions of hyperrapid crystallization

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Expanding the application of aluminum alloys based on the Al-Fe system in the field of electrical engineering and electronics can be achieved by changing the physical characteristics of their surfaces. One of the promising methods for obtaining aluminum alloys by the hyperrapid crystallization with beneficial physical properties is the modification of coating surface by means of vacuum methods [1], including ion beam-assisted deposition (IBAD) [2].

The comparative analysis of the surface microstructure and properties of Al-1.5 at.% Fe alloy films on glass substrates prepared by IBAD has been carried out by means of atomic force microscopy, scanning electron microscopy and the sessile drop method. Film deposition in IBAD was performed using a resonance ion source of vacuum arc plasma (vacuum chamber pressure of 10^{-2} Pa). The rate of "crystallization" (cooling of the cascades) was of the order of 10^{12}-10^{13} K/s.

The analysis of surface properties of the thin films obtained by passive (Fig. 1) and ion beam-assisted deposition regimes demonstrates the ability to control the structure, phase composition and wettability of nanoscale surface structures of Al-Fe alloy films on glass substrates by varying the mode of IBAD.

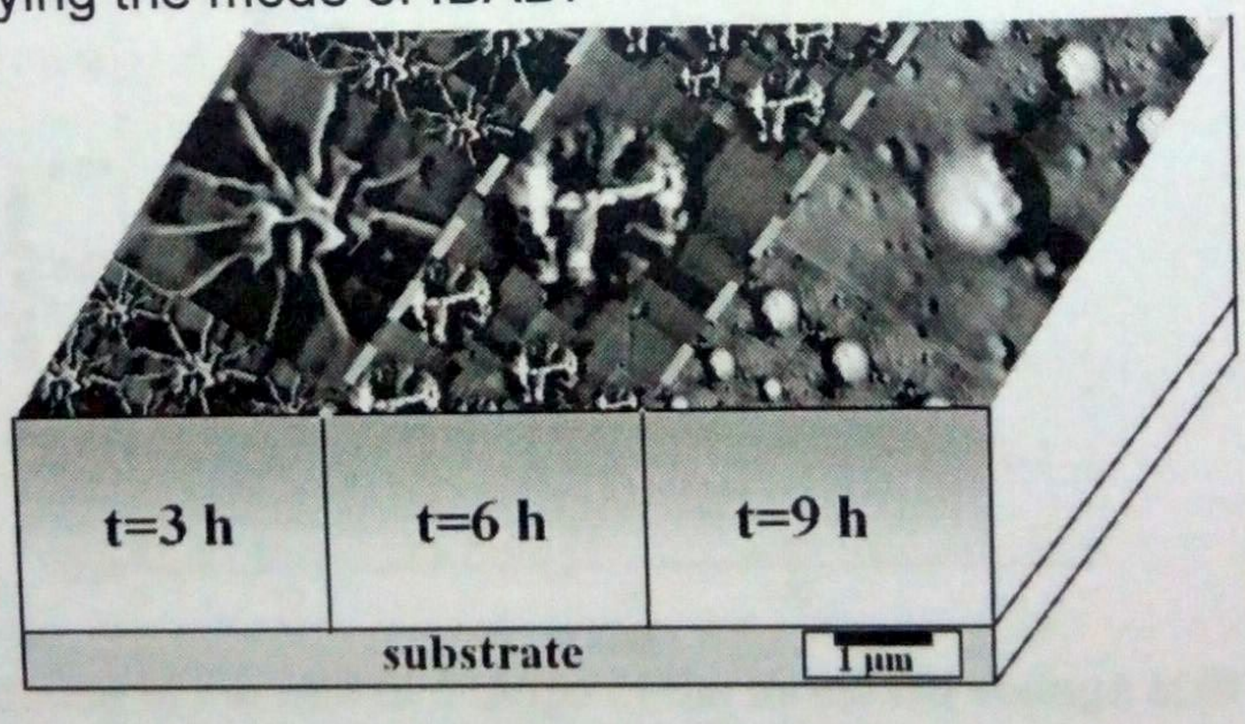

Fig. 1. Surface morphology evolution of thin films of Al - 1.5 at. % Fe alloy depending on deposition time at $U = 0$

References

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